Joonsung Yoon (kr)
Soongsil University
Professor, Global School of Media
dryoon@maat.kr

Suk Chon (kr)
Soongsil University
Ph.D. Candidate, Global School of Media
tians@maat.kr

Hoyeon Lee (kr)
Soongsil University
Ph.D. Candidate, Global School of Media
newcom@nate.com

Jangwon Lee (kr)
Soongsil University
M.S. Program, Global School of Media
jangwon2@maat.kr

Superimposition of Old and New Media: "Light Wall", on Seoul Museum of Art Project

This paper introduces the 3D architectural projection project, "Light Wall" on the Seoul Museum of Art building. On the façade of the over 100 year old building, 3D animated art work is projected calculating and using the complicating contour as a part of a 3D artwork. The decorative façade is not suitable for a usual projection, but the project pronounces loudly the traditional façade using digital-based registration technology. This project does not tone down the physical specificities for the virtual image, but makes reality intermix with the virtual.

Usual beam projection for these decorative contours of the building was not possible, and we used different methods for the projection. This project, however, does not ignore the traditional figure of modern architecture. Rather, the project emphasizes the traditional façade using digital-based registration technology with 4 networked PCs, 3 DLP projectors and the architectural projection software (VVVV, multipurpose toolkit). 2D animation was made by the artist group, MIOON, and PERFORMATIVE transforms the work into the 3D work.

Architectural projection is a way of projection for video or image on the surface of real buildings or three dimensional objects rather than rectangular screens. "The Image Mill," 2008 in Quebec is one of the examples. Large projection of images and films on the grain silos of the Quebec Harbor. Another example is "555 KUBIK," 2009 in Hamburg, Germany. On the façade of the Hamburger Kunsthalle, moving images and animations were projected. Compared to the "Light Wall" project, those two projects were bigger, and the realization was done by separate companies. On the other hand, the "Light Wall" project has a few distinctive characteristics. One is that the project is

Fig. 1: Façade of the Seoul Museum of Art, Seoul, Korea

done collaboratively between the artist and the technologist from the preliminary phase. Second, the project used open source software, which is free to use for non-commercial uses, and leads to low budget. Third, the building structure is relatively complicated, figurative and modern styled traditional and historical.

There are several technical issues. The first issue is the projection-mapping. The actual structures of buildings are all different and unique, and a video should be produced for the projection in real time. The second issue is the virtual light and its shadow simulation. Before the projection project, the building should be simulated as 3D model to produce the virtual lighting and its shadow. In this issue, the camera tracking technology and the technology for getting the background's geometrical information make the process automatic. The third issue is the hand drawing animation. Following the figure and contour of the building, pre-designed animation should be prepared. Finally, in the phase of live projection, the input animation is projected in real time.

The building's decorative window panes, arch-shape gates, layered façade, etc. are real three dimensional objects, and the work projected was a three dimensional animated moving image (Fig. 1). At the first step, a preliminary test for 3D projection was needed to produce the miniature model and 2D design. In this step, 3D model data of the building were constructed. After the basic projection test to optimize the actual building structure and the digital data, 2D model design was gotten in digital format. As the second step, whole hardware and distribution system architecture was accomplished using 3 client computers and one server. There are two ways of distributing images from the source. One is to use Matrox TripleHead2Go, which is a graphics expansion device for multi-display system, and the other is to use server-client system via Ethernet. In the project, the server system was used, and three projectors were connected to each client PCs. All three cli-

Fig. 2: Light Wall, 2009

ent PCs are controlled under the operating server. The benefit of the system architecture is the flexibility of the total screen size by the number of client PCs. In the third step, an operating system was developed based on VVVV. The 2D design of the first step, however, produces unregistered images. The technology team created an original patch for 3D image controlling. It is one of the major technologies, called 3D video mapping. Methods for mash edit patch were developed to transform the point edit. The developed patch enables object files from 3D modeling software such as 3d MAX or MAYA to be exported, manipulated and projected in VVVV. In the fourth step, additional functions and effects for the animation were added. Applying effects, lighting and its shadow were possible. As the final step, 3D projection images and the actual building structures were adjusted. All actual windows are fitted to the image using pattern-based control (Fig. 2).

The Light Wall project is not a way of direct and simple projection and playing on a building, but a way of constructing the same virtual space with the actual building structure, rendering moving images in real time and projecting the reproduced animation on the actual building. Using highly functional graphic treatment technologies, analyzing the optical characteristics of beam projectors for optimizing the resolution and applying the post-image treatment to consider the illuminations of the site's environment and the texture of the building, this project was completed.

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